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AUTHOR McEwen, Nelly
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ABSTRACT

The last decade has seen an enormous increase in interest in and use of educational indicators. This paper focuses on K-12 student outcome indicators and measures of how well students have learned what is expected of them--the *raison d'etre* of schooling. It provides a Canadian perspective on student outcome indicators and has three major purposes: (1) to identify types of student outcome indicators and sources of information; (2) to discuss provincial and national uses; and (3) to discuss issues and identify solutions. A March 1995 survey of provinces and territories provides the information base for current Canadian practice in using and addressing issues in student outcome indicators for this paper. (Contains 45 references and 7 tables.) (Author)

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Uses of Student Outcome Indicators at the Provincial and National Levels: Issues and Solutions

Nelly McEwen
Policy and Planning
Alberta Education

Paper presented at the invited symposium, "International Uses of Indicators",
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Nelly McEwen, Policy and Planning Branch, Alberta Education, Third Floor
Devonian Building East, 11160 Jasper Avenue, Edmonton, Alberta, T5K 0L2
Telephone: (403) 422-4037, FAX: (403) 422-5255, NMcEwen@EDC.gov.ab.ca

Uses of Student Outcome Indicators at the Provincial and National Levels: Issues and Solutions

The last decade has seen an enormous increase in interest in and use of educational indicators. Student learning is the fundamental purpose of education. This paper focuses on K-12 student outcome indicators and measures of how well students have learned what is expected of them – the *raison d'être* of schooling. It provides a Canadian perspective on student outcome indicators and has three major purposes: (1) to identify types of student outcome indicators and sources of information, (2) to discuss provincial and national uses, and (3) to discuss issues and identify solutions. A March 1995 survey of provinces and territories provides the information base for current Canadian practice in using and addressing issues in student outcome indicators for this paper.

This paper focuses on student outcome indicators because they address the fundamental purpose of schooling, namely, that students learn. These indicators are expected to be part of an integrated system which describes a broad range of the conditions of schooling (context, inputs, processes) and desired outcomes. An indicator system should be rooted in a conception of the important components of the operation and outcomes of schooling, and be based on the goals, priorities, and expectations of its originators. It should consist of multiple goals of education (based on appropriate dimensions and domains of schooling), multiple indicators of each goal measured by multiple methods, multiple levels of analysis, and multiple participants (McEwen & Chow, 1991).

There is an extensive body of literature on indicator systems as a tool for reform and accountability. For example, an annotated bibliography prepared for Alberta's Educational Quality Indicators initiative (Alberta Education, 1990) contained 350 citations organized into 14 themes under three major headings: indicator systems,

interpretative framework, and outcomes. Much has been written on the subject since. *Making Education Count* (Organization for Economic Cooperation and Development [OECD], 1994), for instance, is a useful resource on the organization, development, measurement, and uses of indicators, and *Accountability in Education in Canada*¹ (McEwen, 1995) provides a Canadian perspective.

Student Outcome Indicators

There are different types of student outcome indicators and sources of information for provincial and national uses.

Types

There are essentially three types of student outcome indicators – cognitive, affective, and behavioral – based on desired intellectual, personal, social, and vocational learning found in most provincial statements of goals of schooling. Despite the fact that most educational goal statements include variations of this broad range of desired outcomes, student outcome indicators tend to focus on the cognitive domain, specifically academic achievement. Indeed indicator systems are often criticized for including too narrow a range of outcome indicators. Affective indicators, less prevalent than cognitive indicators, are usually some measure of attitude. Fewer provinces use this type of information because of the difficulties in measuring affective outcomes. Some people also consider affective measures to be beyond the purview of the school. Behavioral outcomes are often negatively stated – dropout rates, absenteeism, etc.

Table 1 presents the results of the March 1995 survey to identify the most common student outcome indicators used by Canadian provinces and territories. (Province will be used hereafter to refer to both provinces and territories.) Achievement and participation are the two most commonly used indicators; satisfaction and attitudes are the least used. Prince Edward Island is the only province that does not currently use student outcome indicators.

Table 1
Types of Student Outcome Indicators Used in Canada

Province/Territory	Achievement	Participation	Graduation	Dropout	Satisfaction	Attitudes
British Columbia	√	√	√		√	√
Alberta	√	√	√	√	√	√
Saskatchewan	√	√	√	√	√	√
Manitoba	√	√	√		√	
Ontario	√	√	√	√	√	√
Quebec	√	√	√	√		
New Brunswick	√	√	√	√	√	√
Nova Scotia	√	√	√	√		
Newfoundland	√	√	√	√	√	√
Northwest Territories	√	√	√	√		
Yukon	√	√				
Total	11	11	10	8	7	6

Sources of Information

The three most common ways to collect student data are assessment programs, administrative data, and surveys. A survey of student assessment and examination programs in Canada (Alberta Working Group, 1994) revealed that all but two jurisdictions (Prince Edward Island and the Northwest Territories) had some type of provincial assessment program in the 1993/94 school year. Nine jurisdictions also reported having high school exit examinations for graduating students; the stakes for students range from 30 to 50 percent of the final mark in exam courses, with the remainder assigned by teachers for class work. Traub (1994) and the United States General Accounting Office (1993) also provide useful information about provincial testing programs. All educational jurisdictions collect administrative data about their students – enrollment, gender, types of program, and so forth. These data can be manipulated to arrive at selected indicators such as participation in specific

programs or in school, and graduation and dropout rates. Finally some jurisdictions collect perceptual data from students and others through surveys; such qualitative information helps in the interpretation of the quantitative information provided by assessments and administrative data, and provides some indication of affective and behavioral outcomes which are not readily available from assessments or administrative data.

Each province produces an annual report on education. These reports contain information about the provincial department of education and typically include statistics on students, teachers, and finances. Some provinces also have indicator systems which provide a broader range of information about their education systems. Quebec was the first province to publish an indicators report in 1986. The most recent addition is British Columbia which released its first report in 1994.

At the national level, there are three organizations which collect information about students: the Council of Ministers of Education, Canada (CMEC), Statistics Canada (StatsCan) and the Canadian Education Statistics Council (CESC).

Council of Ministers of Education, Canada – CMEC provides the ministers responsible for education with a mechanism for consultation in matters of mutual interest and concern, and facilitates cooperation in a broad range of activities at the elementary, secondary, and post-secondary levels. In 1989 CMEC initiated the School Achievement Indicators Program (SAIP) which was the first attempt to arrive at a consensus on the elements of a national assessment. Ministers agreed to measure the achievement of 13-year-olds and 16-year-olds in reading, writing, mathematics, and science. The report on mathematics achievement was released in 1993 and the report on reading and writing in 1994 (CMEC, 1993, 1994).

Statistics Canada – Canada's federal statistical agency is responsible for collecting, compiling, analyzing, abstracting, and publishing statistical information relating to the commercial, industrial, financial, social, economic, demographic, and general activities and the condition of Canadians. Statistics Canada conducts a census every five years, develops and disseminates integrated social and economic statistics

pertaining to the whole of Canada and to each of the provinces, and coordinates plans for the integration of those statistics (Government of Canada, 1992). Statistics Canada has a number of publications which focus on education: *Education Quarterly Review*, the annual *Education in Canada, A Statistical Review*, and *Educational Attainment and School Attendance*, which contains information from the 1991 census.

Canadian Education Statistics Council – CESC is a partnership between the CMEC and Statistics Canada. It produced its first *Statistical Portrait of Elementary and Secondary Education in Canada* in 1990; the second edition was released in 1992, and the third will appear in 1995. This publication contains information about students, educators, and finances (CESC, 1992). In September 1993, CESC announced the initiation of the Pan-Canadian Education Indicators Program (PCEIP) to develop better measurements of the performance of our education systems. The long-term goal of this program is to create a full range of indicators to assess education and learning in Canada, from preschool to lifelong learning. The short-term goal is to develop statistical measures in selected indicator areas, focusing on all levels of education and training (elementary, secondary, and post-secondary). The six areas for priority development and the lead jurisdiction responsible for the work in consultation with all provinces and interested partners follow: (1) academic achievement – Alberta, (2) accessibility – Quebec, (3) student flows – British Columbia, (4) school/work transitions – Statistics Canada, (5) citizenship – Ontario, and (6) satisfaction – Newfoundland. The first conceptual paper on academic achievement was recently completed (Alberta Working Group, 1995).

At the international level, three sources of information about education in Canada are the ongoing Indicators of Education Systems (INES) project, the International Assessment of Educational Progress (IAEP), and the Third International Mathematics and Science Study (TIMSS) which will collect data this year. They are important because they provide both national and international comparisons of student achievement and other indicators.

Indicators of Education Systems – Canada is participating in this international project through the CMEC. This OECD project includes four networks, each focusing on different aspects of education: (A) student outcomes, (B) student

destinations, (C) school features and processes, and (D) attitudes and expectations. Canada is represented on Networks A and B. The INES report, *Education at a Glance 2* (OECD, 1993), provided data on member countries in the following areas: demographic, economic, and social context; costs, resources, and school processes; and results of education. Statistics Canada provided provincial results for selected indicators. The third edition of this report was released April 11, 1995.

International Assessment of Educational Progress – The first IAEP in 1988 assessed the mathematics and science achievement of 13-year-olds in five countries and four provinces (Lapointe, Mead, & Phillips, 1989). Nine provinces participated in IAEP II (Lapointe, Askew, & Mead, 1992; Lapointe, Mead, & Askew, 1992). In this 1991 study, 20 countries assessed the mathematics and science achievement of 13-year-old students; 15 countries assessed a representative sample of students and five other countries participated in assessing special populations. Fourteen countries assessed samples of their 9-year-old students in these subjects. About 175,000 9- and 13-year-olds were tested in 13 different languages. The study also provided the option of participating in a performance assessment. Four countries and five provinces participated in the performance task for 13-year-olds (Semple, 1992). The geography portion of IAEP II was a special study of the geographic knowledge and skills of 13-year-olds. Nine countries took part in this component. In Canada, eight provinces participated in the geography assessment (Lazer, 1992).

Third International Mathematics and Science Study – The International Association for the Evaluation of Educational Achievement (IEA) is directing this study with more than 50 countries participating in the 1995 administration. The data collection will focus on three areas – curriculum, instructional practices, and student outcomes. Students will be assessed at three levels: age 9 (grades 3 and 4), age 13 (grades 7 and 8), and the last year in secondary school. The University of British Columbia is coordinating the Canadian national sample. Five provinces are participating as provincial samples: British Columbia, Alberta, Ontario, New Brunswick, and Newfoundland.

Table 2 presents the major sources of information identified by respondents in the provincial survey. All provinces reported using Statistics Canada reports, followed by 11 for the SAIP reports (Saskatchewan is the only province not

participating in this program), ten reported using the CESC statistical portrait, and eight the second International Assessment of Educational Progress (IAEP II) reports based on the assessments of mathematics, science, and geography conducted in 1991.

Table 2
Sources of Information for Indicators

Province/Territory	StatsCan ¹	SAIP ²	<i>Portrait</i> ³	IAEP II ⁴
British Columbia	√	√	√	√
Alberta	√	√	√	√
Saskatchewan	√		√	√
Manitoba	√	√	√	√
Ontario	√	√	√	√
Quebec	√	√		
New Brunswick	√	√	√	√
Nova Scotia	√	√	√	√
Prince Edward Island	√	√	√	
Newfoundland	√	√	√	√
Northwest Territories	√	√		
Yukon	√	√	√	
Total	12	11	10	8

¹Statistics Canada publications

²School Achievement Indicators Program (mathematics, reading, writing)

³*A Statistical Portrait of Elementary and Secondary Education in Canada*

⁴International Assessment of Educational Progress II

Provincial and National Uses of Student Outcome Indicators

Provinces and national associations use student outcome indicators to help them for various purposes. The media and others also use them.

Provincial Uses

Provinces use student outcome indicators for a variety of purposes. Table 3 presents the most common purposes identified by the provinces. Eleven provinces reported using indicators to track trends over time. Ten indicated they use them for public accountability, and nine for informing policy and practice, decision making, and program evaluation. Eight provinces use them for program improvement and strategic planning, five use them to set a provincial standard, and three use them for school evaluation.

National Uses

Education is a provincial responsibility in Canada. The Council of Ministers of Education, Canada facilitates interprovincial cooperation in the School Achievement Indicators Program which assesses achievement in the core subjects (to date, mathematics, reading, and writing). Provinces also participate in international studies of academic achievement; these studies provide both national and international comparisons.

Provinces routinely use Statistics Canada's educational publications to compare their performance on selected indicators with that in other provinces. Some also use the OECD reports for comparative purposes. National associations and the media use the interprovincial, national, and international data for describing the state of Canadian education and comparing it to that in other countries.

Many organizations use secondary sources which are then widely quoted by the media. Secondary sources are not always accurate. For example, Nagy (1994) discussed how an influential report, *A Lot to Learn* (Economic Council of Canada, 1992) inappropriately interpreted international and national student achievement data which Freedman (1993) subsequently duplicated in a report aimed at parents. Among Nagy's criticisms are these authors' misleading interpretation of Canadian achievement trends on the Canadian Tests of Basic Skills, and their distortion of international results by focusing on extreme groups. Barlow and Robertson's (1994) *Class Warfare* provides an international context for criticism of Canada's

Table 3
Provincial Uses of Student Outcome Indicators

Provincial Uses	BC	AB	SK	MB	ON	PQ	NB	NS	NF	NT	YT	Total
track trends over time	√	√	√	√	√	√	√	√	√	√	√	11
public accountability	√	√	√	√	√	√	√	√	√	√		10
inform policy	√	√	√	√	√	√			√	√	√	9
inform practice	√	√	√	√	√	√	√	√	√			9
decision making	√	√	√	√	√	√	√		√	√		9
program evaluation	√	√	√	√	√	√	√	√	√			9
program improvement		√	√	√	√	√	√	√	√			8
strategic planning		√	√	√	√	√			√	√	√	8
provincial standard		√	√				√	√	√			5
school evaluation	√							√	√			3
Total	7	9	9	8	8	8	7	7	10	5	3	

schools; these authors provide evidence to dispel a number of myths about the purported deterioration of public education in Canada. They specifically address the myths that our schools have failed us and our children², that our graduates do not have the skills they need, and that big business is creating highly skilled jobs. These two publications illustrate how erroneous interpretations of data not only mislead the public, but can undermine confidence in education.

The public gets most of its information about education from the media. A search of some of Canada's online newspaper and newswire data bases³ indicated that in March 1995, there were over 1,500 news items on education in Canada. If the international Reuter's Textline is added, more than 2,000 news items on education were available for print and electronic media to use in their coverage of education. In Alberta, newspapers published more than 1,200 articles on education. By contrast, Alberta Education released 72 press releases over the past twelve months, an average of about six per month. The Alberta example illustrates how the media present information about education at a rate far exceeding that provided by a provincial department of education.

There is a clear need for the education community to provide accurate information that the lay reader can understand. Too often reports on education are full of jargon which does not communicate. The public often prefers brief accounts of results and accepts the media's interpretation of public reports. Education officials should provide a synopsis to the media which will otherwise interpret the information according to their understanding of the material. Tufte (1983, 1990) has provided exemplars of how to display information for a visually literate public that often prefers to get its information from television rather than printed material.

Issues and Solutions

There are many issues in using student outcome indicators. This paper addresses political and financial, technical and administrative, interpretive and communicative, and comparative issues. There are several discussions of issues related to indicator systems in the literature; see, for example, Alberta Working Group (1995), McEwen and Chow (1991), Nagy (1994), Oakes (1986), Office of Educational Research and Improvement (1988), and Organization for Economic Cooperation and Development (1992, 1994). The issues and solutions are discussed together with examples from

the March survey to illustrate how provinces are addressing these issues. Four tables summarize the discussion of each set of issues; the 16 issues are numbered consecutively over the four tables.

Political and Financial Issues

There are four major political and financial issues: responsibility for education, value for investment, funding, and public confidence.

Responsibility for Education – Section 93 of Canada's Constitution Act, 1867, confers on the provincial legislatures the exclusive power to make "laws in relation to education". By virtue of this power, the establishment and administration of schools and universities is a provincial responsibility (Hogg, 1992, p. 1227). Therefore, each province is responsible for the governance, programs, and funding of its education system. At the national level, provinces cooperate through the Council of Ministers of Education, Canada and the Canadian Education Statistics Council on matters of mutual interest.

Value for Investment – The value, or return on investment, of all public services is being questioned in this time of fiscal restraint, restructuring, and global competitiveness. In 1991/92, Canada invested \$33 billion in elementary and secondary education, which accounts for 63% of the total national spending of \$53 billion on all levels of education; an estimated 34% of the adult population held post-secondary credentials (Statistics Canada, 1994a). In the 1991 IAEP II, Canadian students scored above the average and ranked in the middle of participating countries in mathematics, science, and geography. Canada ranked first of 28 industrial countries on the 1992 human development index (HDI) which is a composite of longevity, knowledge, and standard of living⁴ (United Nations Development Programme, 1994). However, the differences among the closely-clustered top countries are not significant (e.g., (1) Canada 0.932, (2) Switzerland 0.931, (3) Japan 0.929). See Finn (1994) and Castonguay (1995) for critiques of the HDI⁵.

Funding for Education – Notwithstanding the foregoing evidence of Canada's return on its investment in education, provinces are facing reduced revenues, and, therefore, less money for education. At the K-12 level, they are prioritizing their activities and

allocating resources to priorities. Nationally, they are cooperating through CMEC on curriculum development and on the School Achievement Indicators Program assessments in reading, writing, mathematics, and science for 13- and 16-year-old students. Through the CESC, they are involving national nongovernment organizations in the development of the Pan-Canadian Education Indicators Program. Regionally, some provinces are involved in cooperative curriculum development, namely, the Western Canadian Protocol for Collaboration in Basic Education (K-12) (language arts and mathematics) and the Atlantic Region Common Curriculum Initiatives (language arts, mathematics, and science, grades 1-12).

Public Confidence – The provinces recognize the need to inspire confidence in public education since 57% of families do not have children who are less than 16 years of age (Statistics Canada, 1994b). Studies have indicated that parents with children in school are more supportive of public education than people who are less directly involved in school (see, for example, Elam, Rose, & Gallup, 1994; Livingstone, Hart, & Davie, 1995). The proportion of families without children is increasing as Canadians age and have fewer children. It is imperative, therefore, for provinces to demonstrate the value of the investment in education so that the public has confidence that our next generation is well prepared to contribute to the social and economic well-being of Canada. Asking diverse clients – such as students, parents, and others – their opinions identifies strengths, weaknesses, and issues associated with public education.

In the March survey, seven provinces indicated that they collect students' perceptions; some also collect such qualitative information from other groups. The British Columbia Ministry of Education (1994) reported the attitudes of students, graduates, employers, and post-secondary instructors toward selected aspects of education; Alberta Education (1994b) has committed, in its three-year business plan, to measuring the satisfaction of students, parents, the public, educators, and the business community on a regular basis. Saskatchewan Education, Training and Employment (1994) reported the opinions of students, teachers, parents, and the public about the effectiveness of its education system. In 1994, Manitoba surveyed a sample of grade 12 students to provide an evaluation of the province's education system and suggestions on how the system could be improved. Ontario collected perceptions from its grade 9 students, their teachers, and parents as part of its reading and writing assessment (Ontario Ministry of Education, 1994). The Ontario Institute for Studies

in Education has been conducting biennial surveys of public attitudes toward education in Ontario since 1978 (Livingstone, Hart, & Davie, 1995). New Brunswick surveys all of its grade 8 and 11 students on selected aspects of schooling, and Newfoundland surveys all of its students in grades 6, 8, and 12 about the quality of school life (Newfoundland Department of Education, 1994). Existing national surveys of attitudes toward K-12 education are either dated (Williams, & Millinoff, 1990) or conducted for specific clients and, therefore, not readily accessible to the public. Satisfaction is one of the six areas for priority development in the Pan-Canadian Education Indicators Program. Table 4 summarizes the discussion of political and financial issues.

Technical and Administrative Issues

This involves the largest number of issues for student outcome indicators. It includes definitions, student comparability, census or sample, student data bases, and data collection and analysis. The absence of adequate infrastructure for tracking, monitoring, and compiling up-to-date data is a Canada-wide problem.

Definitions – This is a major problem in national and international studies because definitions and methods used to calculate indicators are not uniform. Therefore, comparison and interpretation of indicators can be problematic. Dropout statistics serve as a useful illustration because they are so often cited as evidence of the failure of schools. Methods for calculating dropout statistics generally fall into three categories: annual, longitudinal, and net.

- *Annual rates* estimate the proportion of all students who drop out of school in a given school year,
- *longitudinal rates* estimate the proportion of a given cohort of students who drop out over the course of their schooling (this includes former dropouts who returned to school), and
- *net rates* estimate the proportion of a given cohort (e.g., 18-year-olds) who have not graduated and who are not in school at a specific point in time (this excludes former dropouts who have returned to school).

Gilbert et al. (1993) discussed five methods to estimate Canadian dropout rates which fall under the category of net rates: (1) the complement of the graduation rate, (2) the apparent cohort dropout rate, (3) census estimates, (4) Labour Force Survey estimates, and (5) the School Leavers Survey. The first two are based

Table 4
Summary of Political and Financial Issues and Canadian Solutions

Political and Financial Issues	Provincial Solutions	National Solutions
1. Responsibility for education	Each province and territory is responsible for its own system of education.	Provinces cooperate through the Council of Ministers of Education, Canada and the Canadian Education Statistics Council on educational matters of mutual interest and concern.
2. Value for investment	Provinces are becoming more proactive in demonstrating the value of public education through publications targeted at the public.	Through the CMEC and CESC, provinces are publishing student outcome indicators of achievement (SAIP ¹) and involvement in education (participation, graduation, dropout rates) (Portrait ²).
3. Funding for education	In this time of fiscal restraint, provinces are prioritizing their activities and allocating scarce resources to priorities.	Provinces are beginning to share the cost of developing curriculum and assessment materials.
4. Public confidence	Expectations of and satisfaction with education are important for public support. Several provinces are collecting perceptions about schooling from students and other groups (e.g., parents, public, educators).	Existing national surveys of K-12 education are either dated (1990) or developed for specific clients. The PCEIP³ is developing an indicator of satisfaction with education in Canada.

¹ School Achievement Indicators Program

² A Statistical Portrait of Elementary and Secondary Education in Canada

³ Pan-Canadian Education Indicators Program

on administrative data and the last three on survey data. Not only do the methods of calculation provide different estimates of dropout rates (from 18% by method 5 versus 32% by method 2 for Canada), but they also rank the provinces differently, and confuse everyone as to what the rates mean. When the rates can vary by as much as three times for a province (14% by method 5 and 40% by method 1 for Alberta), there is obviously a problem in how analysts have conceptualized and calculated this indicator. Some of the difference in rates is accounted for by the fact that various methods address different aspects of the dropout problem, but limitations in some of the methods have resulted in misleading statistics (Alberta Education, 1994a).

A provincial student-level data base allows provinces to calculate more precise estimates by actually tracking students over time. Calculations can be refined if the effects of interprovincial migration are addressed in the estimate. In the absence of a national student-level data base, calculation of national dropout indicators is limited by the types of data available for interprovincial comparisons. These calculations are then a compromise which provide estimates of provincial rates based on the national definition used, but frustrate provinces that can calculate more precise estimates. Since many educational organizations and the media use interprovincial comparisons to make statements about Canadian education, it is in the best interests of the provinces to work diligently toward providing comparable data that can provide the most precise estimates possible.

Student Comparability – This can be a serious problem in international studies where mass and elite education systems are sometimes compared. In Canada, all students must remain in school until the age of 16, and indicators are based largely on the total student population. Provinces that have assessment and examination programs typically assess all students in selected subjects at specific grades, and sample students for performance tasks. Many provinces also provide analyses of results by gender and other subgroups. Results are then tracked over time. Nationally, representative samples are drawn from all provinces participating in the School Achievement Indicators Program. Common definitions are used in calculating graduation, participation, and dropout (school leaver) rates based on cohort analysis of provincial populations at specific ages. As mentioned above, however, the national definitions are not always those used at the provincial level where student-level data bases permit more accurate estimates.

Census or Sample – Most provinces assess all students through their assessment programs whose major function is monitoring performance; several provinces also draw representative samples of students to complete performance tasks. High school exit examinations certify student achievement; all students enrolled in these courses write the exams. Four provinces (British Columbia, Alberta, Saskatchewan, and Manitoba) sample students to collect their perceptions about aspects of schooling; three provinces (Ontario, New Brunswick, and Newfoundland) survey all of their students as part of their assessment programs. At the national level, all students in the target population are included in the calculation of graduation, participation, and dropout rates. For the SAIP assessments, representative samples of 13- and 16-year-old students are drawn, ages at which Canadian students are still in school.

Student Data Bases – Provinces are either developing a student-level data base or already have one. British Columbia, Alberta, Quebec, New Brunswick, Newfoundland, and the Northwest Territories currently have student-level data bases. In most cases, the data base began with high school students because of the need to certify graduates when they leave school. A student-level data base facilitates greater precision in estimating student involvement indicators and analysis of comparisons among different variables. The biggest issue with a student-level data base is confidentiality. Provinces need policies to protect student-level data and to determine eligibility for access to such information. This is becoming more important with freedom of information legislation allowing the public to have access to aggregated school-level data. Since there is no national student-level data base for education, involvement indicators must be calculated on the basis of age or grade cohorts.

Data Collection – Schools administer achievement tests to their students. New Brunswick identified four issues related to data collection: (1) burden on schools and districts; (2) perceived need for/relevance of new data, (3) reliability and validity, and (4) impact on financial and human resources.

We make sure we have a really good reason for collecting data. The need is then balanced against factors such as how much effort (time, money, staff) will be required at the department, district, and schools. We must ask ourselves if the data can be collected within the current budget (as new money is hard to come by), can we obtain the data efficiently using new technologies, are standards in place to ensure that the data are reliable and comparable?

Survey respondent from New Brunswick

At the national level, each province except Saskatchewan collects its own data for SAIP and the CESC portrait. Guidelines are in place to ensure that uniform data collection procedures are followed. CESC (1994) published a *Handbook of Education Terminology Elementary and Secondary Level* to standardize definitions and analytic applications.

Data Analysis – Provinces analyze student achievement data themselves; British Columbia also uses contractors to help with the analysis. Saskatchewan indicated that it completes analyses in consultation with stakeholders. Alberta has engaged external consultants to collect and analyze perceptions about education; third-party administration and analysis enhance the credibility of survey findings. At the national level, Statistics Canada analyzes the data for the CESC statistical portrait. Teams of teachers from all participating provinces score the open-response questions of the SAIP assessments in central locations under the supervision of the development teams; CMEC then arranges with a province to analyze the data, and engages consultants to prepare the reports. Provinces have input into the draft report before publication. Table 5 summarizes the discussion of technical and administrative issues.

Interpretive and Communicative Issues

Whereas educators have had access to professional information about the education system for some time, parents and the public have only recently become target audiences for such information. These lay audiences are particularly interested in what students know and can do. Therefore, student outcome indicators need to be reported in such a way that diverse needs can be served: parents want to know that their children are learning, the public wants to know that its investment in education is providing desired results, educators want information to help them improve results, and so forth. A single report will not serve all of the different needs. The issues related to interpreting and communicating information for various audiences include validity and reliability, context and interpretation, district/school support, and public reporting.

Validity and Reliability – Provinces are careful to ensure that their assessment instruments are valid and reliable. Instruments are usually criterion referenced to provincial programs of study, are reviewed by curriculum specialists and teachers, follow standard test development and field-testing procedures, and item analysis to

Table 5

Summary of Technical and Administrative Issues and Canadian Solutions

Technical and Administrative	Provincial Solutions	National Solutions
5. Definitions	Provinces use their own definitions. Those with student-level data bases can calculate more precise estimates from administrative data.	Provinces have a common set of definitions for the portrait; they are beginning to discuss the value of a national student-level data base.
6. Student comparability	Provinces are responsible for all students in their jurisdiction. Some provinces analyze results for subgroups.	Use of common: • instruments for the SAIP assessments • definitions and methods for graduation, participation, dropout rates.
7. Census or sample	Provinces use a census for achievement testing and calculation of indicators from administrative data. They sample students for performance assessments. For opinion surveys, they either survey all students or sample them.	Representative samples of students are included in the SAIP assessments; all 13- and 16-year-old students are in school. All students are included in the calculation of indicators from administrative data.
8. Student data bases	Provinces either have or are developing student-level data bases to improve calculation of indicators and analysis of relationships among indicators. They are developing policies on confidentiality of student information under access to information legislation.	Current involvement rates are based on age cohorts. CESC has common definitions for indicators and analytic applications. Provinces could develop an agreed-upon standard for a student-level data base and data exchange through the CESC.

Table 5 (continued)

Summary of Technical and Administrative Issues and Canadian Solutions

Technical and Administrative	Provincial Solutions	National Solutions
9. Data collection	Provinces collect their own data. Schools administer provincial assessments, and departments collect administrative data.	Provinces collect their own data for SAIP and CESC. The CESC terminology handbook helps to ensure uniform data collection procedures.
10. Data analysis	Provinces analyze assessment and administrative data in-house.	CMEC arranges with a province to analyze data for the SAIP. Statistics Canada analyzes data for the portrait.

ensure reliability. Teachers are extensively involved in the development of tests and in marking written response items. Test administration is standardized so that all students have the same amount of time to complete the assessments and follow the same directions. Additional strategies include a provincial exam board (British Columbia) and the use of panels to set provincial standards for achievement tests (Alberta).

Provincial assessments serve primarily as a way to monitor performance and evaluate programs, with no stakes for students. In the nine jurisdictions having high school exit examinations, the stakes for students range from 30 to 50 percent of the final mark in these courses, with the remainder assigned by teachers for class work; blended final marks are valid because they are based on both class work and the departmental examination.

The SAIP assessments are developed in both English and French by teams of educators from lead provinces in consultation with subject specialists from each of the other provinces. Mathematics, reading and writing team members came from Alberta, Ontario, and Quebec; science team members are from Alberta, New Brunswick, Ontario, and Saskatchewan. Criteria are developed to identify and

describe five levels covering the expected range of achievement for both age groups in each subject area. Questions are then developed to measure attainment of these criteria. Teachers from across Canada participate in developing the test items. The development teams and subject specialists review the questions to ensure that they are free from cultural and gender bias and stereotyping. Each province also verifies that the assessment materials provide a good match with its curriculum objectives. Questions are extensively field-tested to confirm that the results could be used to assign students to levels.

Context and Interpretation – Provinces are sensitive to the effect of context on student outcomes. Most survey respondents indicated that they use contextual variables to help explain or interpret outcomes. Strategies used to help interpret results include interpretation panels and response groups (British Columbia), guidelines (Alberta), consultations with stakeholders (Saskatchewan), and workshops and comprehensive reports (Newfoundland). New Brunswick indicated it publishes annual dropout rates by school but does not provide any interpretation of the results; districts receive their results in advance of the public which allows them time to prepare their own explanations of local results.

Any indicator can be distorted unless there is an understanding of the contextual factors. There has to be an emphasis on the use of many indicators, both qualitative and quantitative, if judgments about the effectiveness of the system are to be reliable and valid.

Survey respondent from Newfoundland

At the national level, little interpretation of student outcome indicators is provided. The CESC portrait contains an appendix describing the financing of education in each province. The SAIP reports provide limited interpretation; in addition to the achievement results for Canada and each province and information about the assessment, they describe the social context, organization of the school system, and teaching and testing in each province. Provinces assume responsibility for discussing results when the reports are released since they are accountable for decisions regarding the scope and sequence of programs and resource allocations.

District/School Support – Survey respondents interpreted this question in two ways. Some responded in terms of provincial support to districts and schools, while others described the support districts demonstrate for provincial indicators.

The former indicated that they provide school and jurisdiction reports and consultation with local staff regarding policy positions and measures (Alberta), and professional development (Ontario). Newfoundland reported that the comprehensive school profiles have elevated the need for full district/school support; it plans to introduce a local indicator report card pilot project at the district level, followed by the school level. New Brunswick indicated that it does everything possible to reduce the burden, provide resources, and demonstrate the value of indicators in order to get district and school support. Nova Scotia involves districts and schools in planning and concentrates on how the information can help them. Upon request, Manitoba provides school divisions with data and analyses which correspond to their own division, as well as those for the province as a whole.

British Columbia requires districts to report to their publics annually, and, as of the 1993/94 school year, these reports must contain ten indicators of performance (both student and district). The province provides the necessary data and a set of graphic and page layout templates. As well, it provides schools and districts with annual profiles that contain district data and a brief interpretive framework.

District and school support is important for the SAIP assessments because selected schools must administer the tests to their students. Provincial coordinators work with these schools to monitor administration and to ensure that these schools support the program. Because the CESC portrait relies on provincial administrative data, it requires the cooperation of departmental staff.

Public Reporting – Provinces release results for their assessment programs through annual reports. These reports are written for a professional audience and provide a provincial picture of student results. Some also have newsletters for distribution to the public, for example, *How are Students Doing?* (Alberta). Indicator reports and press releases are also targeted at the general public.

Relevance and timeliness are issues in public reporting. Provinces usually release provincial results through press releases soon after the tests have been scored, and results have been sent to districts and schools. Provincial reports take longer to prepare and do not usually appear until the following year; this is not unexpected

given the types of analyses these reports contain. The SAIP reports have appeared by December of the year of testing. CMEC publishes 30,000 copies (22,500 in English and 7,500 in French), distributes them widely, and makes them available upon request. A technical report is available from each provincial ministry and from CMEC within a year of test administration. The CESC portrait is written for professional audiences. The 1992 edition presented data primarily for the 1989/90 school year; the 1995 edition will report data for the 1992/93 school year. The more jurisdictions involved in providing data, the longer it takes to verify the data and publish a report.

Timeliness is a problem shared by the international indicator reports. The 1995 *Education at a Glance 3* contains data for the 1991/92 school year. In today's world of the internet and live television coverage of events, people expect instant results. However, time is required to clean data, check ranges, verify entries, confirm data, and analyze results. As the collection and analysis of data become more routine, this issue may be resolved. Table 6 summarizes the discussion of interpretive and communicative issues.

Comparative Issues

Indicators take their meaning from comparisons with points of reference – time, groups, or targets. Eleven jurisdictions indicated that they track provincial trends over time. Comparing performance at the local, provincial, national, or international levels varies from province to province. For example, Canada is participating as a country in the Third International Mathematics and Science Study; five provinces are also participating as provincial samples – British Columbia, Alberta, Ontario, New Brunswick, and Newfoundland. Statistics Canada prepares interprovincial comparisons of the OECD education indicators for the provinces. Targets include benchmarks and standards. Benchmarks describe the existing level (baseline) whereas standards define an optimal or desired level; targets specify a feasible level of improvement within a predetermined period of time. A target sets an improvement increment over what exists (the benchmark) in an attempt to reach what is desired (the standard). Five provinces indicated that provincial performance serves as a provincial standard.

Table 6

Summary of Interpretive and Communicative Issues and Canadian Solutions

Interpretive and Communicative	Provincial Solutions	National Solutions
11. Validity and reliability	Provinces base their assessments on their programs of study and follow standard procedures in developing instruments. Standardized procedures are in place for uniform test administration.	Teams develop SAIP tests in English and French in consultation with subject specialists from each province. Tests are reviewed for cultural and gender bias, and stereotyping. Indicators in the portrait are based on agreed-up definitions and methods.
12. Context and interpretation	Provinces use contextual information to help interpret provincial results.	National reports contain limited interpretation. Provinces interpret results according to their own circumstances.
13. District/school support	District and school support is important for uniform administration of assessment instruments and use of results to improve student learning. Provinces assist districts and schools to interpret and use local results.	Provincial coordinators work with sample schools for the SAIP assessments to ensure support. Provincial representatives provide administrative data for the CESC portrait.
14. Public reporting	There are three types of provincial reports: • press releases for results soon after tests are scored • annual reports within a year of administration • public indicator reports Press releases are timely but provide little analysis while results reports take longer to prepare but provide in-depth analyses for professionals.	SAIP results are released in a timely manner. CESC portraits are published biennially.

School/District Comparisons – Provinces provide results on assessments and examinations to their districts and schools for local use. Five jurisdictions indicated they avoid or discourage comparisons between schools and the district (Saskatchewan, Manitoba, Ontario, Northwest Territories, Yukon). The British Columbia Ministry of Education provides the results for a composite of comparable districts. Alberta Education encourages districts and schools to compare their results to provincial standards where 85% of students are expected to achieve the acceptable standard or higher on provincial achievement tests at grades 3, 6, and 9. Nova Scotia shares and discusses results and assists people in their interpretation and use of information.

Three provinces publish results by district and/or school. Newfoundland provides district comparisons in provincial documents. Quebec has been publishing school board results for some time; in 1994 it began publishing results by school as well (Ministère de l'Éducation du Québec, 1994). New Brunswick publishes annual dropout rates by school.

Interprovincial Comparisons – All jurisdictions reported using some or all of the national and international reports (Statistics Canada reports, the SAIP assessments, the CESC portrait, and IAEP II). See Table 2, p.7. Provinces are cooperating on national tests and expanding the range of outcome indicators through the development of the Pan-Canadian Education Indicators Program. The PCEIP is also involving national nongovernment associations to enhance its validity. Some provinces indicated they will use the TIMSS data and other sources for comparative purposes. Table 7 summarizes the discussion of comparative issues.

Conclusion

Since provinces are responsible for education in Canada, they set the direction for themselves and their constituents. Of the three types of student outcome indicators, cognitive ones predominate. Provincial student assessment and examination programs are the most common way for provinces to demonstrate accountability. Most provinces make use of one or both of these programs. In order to provide external points of reference (other provinces and Canada as a whole), provinces are cooperating through the Council of Ministers of Education, Canada in the development and implementation of the School Achievement

Table 7
Summary of Comparative Issues and Canadian Solutions

Comparative Issues	Provincial Solutions	National Solutions
15. School/district comparisons	Provinces take three general approaches: • some encourage comparisons with provincial results • some discourage school/district comparisons • some publish school and district results	Not applicable.
16. Interprovincial comparisons	Interprovincial comparisons provide external points of reference. Most provinces use inter-provincial data provided by: • Statistics Canada • SAIP • CESC portrait • IAEP II	Provinces are cooperating through CMEC and CESC to provide comparable data on selected indicators.

Indicators Program (for mathematics, reading, writing, and science), and through the Canadian Education Statistics Council in the Pan-Canadian Education Indicators Program (academic achievement, accessibility, student flows, school/work transitions, citizenship, and satisfaction). Periodic international assessments provide a way to compare Canadian education systems with those in other countries.

Cognitive indicators are the most commonly used student outcome indicators in Canada as they are elsewhere. Most provinces also use graduation and dropout rates; seven collect information on affective indicators as well. Eleven jurisdictions use indicators to track trends over time, ten use them for public accountability, and nine for informing policy and practice, decision making, and program evaluation. Eight use them for program improvement and strategic planning. Provinces provide information to local jurisdictions, but vary in how they want districts and schools to

use provincial, district, and school results. All types of information are provided to help improve student learning; beyond that, provinces follow different approaches in their expectations of district and school use and dissemination of information.

Political and financial, technical and administrative, interpretive and communicative, and comparative issues are common to most indicators. Provinces resolve these issues in similar ways and cooperate through the CMEC and CESC to address them at the national level. The discussion of some of the indicators highlights the dilemmas inherent in varying provincial capacities to collect and analyze data. The pitfalls of alternative approaches, with their conflicting messages, undermine public confidence in the information they are intended to convey.

Provinces, CMEC, and CESC are becoming more proactive in providing timely and relevant information to a public bombarded by the media's opinions and often inaccurate facts about the state of education. If public education is to enjoy taxpayers' support in times of shrinking resources, public confidence is essential. Student outcome indicators focus attention on student performance, communicate how successful the performance is, and, in conjunction with an integrated indicator system, propose strategies for improvement. However, the emphasis must remain on student outcome indicators because they are fundamental to our efforts to improve student learning. When such indicators are based on the important goals of schooling, they become a powerful way to concentrate action on improvement.

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Notes

1. This special issue features accountability programs in British Columbia, Alberta, Ontario, Quebec, and Newfoundland. The articles are followed by comments from representatives of four national organizations – the Canadian School Boards Association, the Canadian Association of School Administrators, the Canadian Teachers' Federation, and the Canadian Society for the Study of Education. The five provincial representatives then respond to the observations of the four discussants.
2. Barlow and Robertson address the following myths associated with how our schools have failed us: at least 25% of Canadians are illiterate; our dropout rate is at least 30%; we spend more on education than [virtually] any country in the world, and have less to show for it; students in all countries with which Canada competes work harder and longer; when our student results are compared with those of our international competitors, we are beaten by nearly everybody.
3. There is a wide range of full-text online newspaper and newswire data bases available in Canada and for Canada. Some examples can be described as follows: Canadian Press (CP) is cooperatively operated by Canada's newspapers and provides exhaustive coverage of social, political, economic, and cultural news events from bureaus across Canada, the United States, and the United Kingdom; stories and updates are prepared for over 90 subscribing newspapers. Broadcast News serves more than 500 Canadian radio and television stations. Reuter's Textline Global News contains articles from all the major daily newspapers of Europe and other sources from the Middle East, Africa, Australia, New Zealand, and the Americas.

The search strategy to identify news items on education was as follows: FIND education OR teacher(s) OR school(s)(ing) wherever they appear in the headline or lead of the news items. It is estimated that approximately 20% of all stories retrieved in this manner on a daily basis do not deal with education in a prominent manner where the three key words (education OR teacher(s) OR school(s)(ing)) can create false drops (e.g., Harvard Business SCHOOL or EDUCATION of consumers). Taking this into account, this search strategy identified 753 stories from Canadian Press Newswire Service, 781 from a global search of Canada's full-text online newspaper and newswire data bases, 575 from Reuter's Textline, and 1,223 from a local/regional clipping service in Alberta. We estimate the duplication among data bases to be about 10% between CP and the Alberta service, and 10% between CP and the global search.

4. The Human Development Index (HDI) is a composite of three basic components of human development: longevity (life expectancy), knowledge (a combination of adult literacy and mean years of schooling (2/3 and 1/3 weight respectively)), and standard of living (purchasing power, based on real GDP per capita adjusted for the local cost of living (purchasing power parity, or PPP). The HDI offers an alternative to GNP for measuring the relative socioeconomic progress of nations and enables people to evaluate progress over time and to determine priorities for policy intervention (United Nations Human Development Programme, 1994, p. 91).
5. Finn (1994) criticizes the HDI because it is based on only three factors (the only three that could be measured for all 173 countries) and that it reflects national averages, thus failing to reveal inequalities that exist within the countries studied. Castonguay (1995) criticizes the index because it clusters the top 17 nations since the index estimates adult literacy in the top 17 countries to be 0.99, and the income index fails to differentiate significantly among the leading countries; this leaves only life expectancy and schooling to weakly distinguish among the top 17. Both critics recommend the use of the HDI adjusted for gender disparity and income distribution. Canada ranks 9th on the HDI adjusted for gender disparity (Sweden is first) and 8th on the HDI adjusted for income distribution (Japan is first).

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